* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
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CLAIMS

[Claim(s)]
[Claim 1] the fiber for the doll hairs which consists of filaments whose outer diameters which (A)/(B) =95 / 5 - 20/80 (weight ratio) come out comparatively, and come to carry out the melting unification of a kind of thermoplastics (A) and the thermoplastic polymer (B) which has glass transition temperature in the 0-degree-C or more range of 70 degrees C or less, or the two sorts or more are 30 micrometers - 200 micrometers.
[Claim 2] A kind of thermoplastics (A) and the thermoplastic polymer (B) which has glass transition temperature in the 0-degree-C or more range of 70 degrees C or less, or two sorts or more (A) -- by /(B) =95 / 5 - 20/80 (weight ratio) coming out comparatively, coming to carry out melting unification, and applying external force beyond the temperature near the glass transition temperature of said thermoplastic polymer (B) in the temperature region of under the melting point Fiber for the doll hairs equipped with the function which can deform into the configuration which adapted itself to said stress freely, and is fixed to said configuration which deformed in the temperature region of under glass transition temperature.
[Claim 3] Thermoplastics (A) and the thermoplastic polymer (B) which has glass transition temperature in the 0-degree-C or more range of 70 degrees C or less are claim 1 or the fiber for the doll hairs of 2 which constitutes the filament which the melting blend was carried out and was unified.
[Claim 4] Thermoplastics (A) and the thermoplastic polymer (B) which has glass transition temperature in the 0-degree-C or more range of 70 degrees C or less are claim 1 or the fiber for the doll hairs of 2 which comes to constitute the filament of the bicomponent fiber gestalt which welding of mutual was carried out and it unified.
[Claim 5] Thermoplastics (A) is claim 1 thru/or the fiber for the doll hairs of 4 chosen from thermoplastic elastomer.
[Claim 6] Thermoplastic elastomer is fiber for the doll hairs of claim 5 which is the polymer chosen out of any of a polyamide system, a polyurethane system, a styrene system, a polyolefine system, a poly-butadiene system, a polyester system, or an ethylene-vinyl acetate system copolymer they are.
[Claim 7] For thermoplastics (A), a thermoplastic polymer (B) is claim 1 chosen from the polymer with which the chemical structures differ thru/or one fiber for the doll hairs of 4.
[Claim 8] A thermoplastic polymer (B) is claim 1 which comes to exist where a distributed condition, or distribution and a compatible condition are intermingled thru/or one fiber for the doll hairs of 4.
[Claim 9] A thermoplastic polymer (B) is claim 1 which are one sort or two sorts or more of polymers chosen from saturated polyester resin, acrylic ester resin, methacrylic ester resin, or vinyl acetate resin thru/or one fiber for the doll hairs of 4.
[Claim 10] Thermoplastics (A) is claim 1 as which the melting point or softening temperature is chosen from resin 100 degrees C or more thru/or one fiber for the doll hairs of 4.
[Claim 11] Thermoplastic elastomer is claim 1 to which it is a polyamide system elastomer, a thermoplastic polymer (B) is saturated polyester resin which has the glass transition temperature of 0 degree C - 50 degrees C, and said saturated polyester resin comes to occupy the rate of 5 - 80 weight

section of all resin thru/or one fiber for the doll hairs of 4.
[Claim 12] Claim 1 which an reversible thermochromism microcapsule pigment comes to contain in the distributed condition thru/or one fiber for the doll hairs of 11.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the fiber for the doll hairs. The melting unification of the thermoplastic polymer which has thermoplastics and a specific glass transition temperature is carried out at a predetermined rate, and beyond the temperature near the glass transition temperature of said thermoplastic polymer, by applying external force in the temperature region of under the melting point, it can deform into an arbitration configuration freely and is related with the fiber for the doll hairs which said configuration which deformed equipped with the function fixed in the temperature region of under glass transition temperature at a detail.
[0002]
[Description of the Prior Art] Conventionally, generally synthetic fibers, such as fiber, and a polyamide, polypropylene of a vinylidene-chloride system and a vinyl chloride system, are used as fiber for the doll hairs. Moreover, the synthetic fiber which becomes JP,5-76880,B from the acrylic polymer which contains acrylonitrile, and a vinyl chloride and/or a vinylidene chloride at a predetermined rate, respectively is indicated.
[0003]
[Problem(s) to be Solved by the Invention] By the way, if it is in the hair using the above mentioned synthetic fiber, it is an elevated temperature more than the softening temperature of fiber, if a special fixture moreover is not applied, a hair form cannot be made to deform, and a small child etc. cannot give curl etc. and cannot play freely. It can be made to deform into a simply free hair form suitably in a 30 degrees C - 60 degrees C temperature region. this invention -- the temperature region not more than ordinary temperature -70 degree C -- The hair form which deformed by cooling can be fixed and the need is accepted. Restore said fixed hair form to the original condition, or It has deformation of a repeat, the restoration function, and delayed persistency of being able to deform into another hair form, and even if a small child etc. has, it is going to offer the fiber for the doll hairs which can be made to be able to deform a hair form simply and can play.
[0004]
[Means for Solving the Problem] this invention makes requirements the fiber for the doll hairs which consists of filaments whose outer diameters which (A)/(B) =95 / 5 - 20/80 (weight ratio) come out comparatively, and come to carry out the melting unification of a kind of thermoplastics (A) and the thermoplastic polymer (B) which has glass transition temperature in the 0-degree-C or more range of 70 degrees C or less, or the two sorts or more are 30 micrometers - 200 micrometers. Furthermore, a kind of thermoplastics (A) and the thermoplastic polymer (B) which has glass transition temperature in the 0-degree-C or more range of 70 degrees C or less, or two sorts or more (A) -- by /(B) =95 / 5 - 20/80 (weight ratio) coming out comparatively, coming to carry out melting unification, and applying external force beyond the temperature near the glass transition temperature of said thermoplastic polymer (B) in the temperature region of under the melting point It can deform into the configuration which adapted itself to said stress freely, and let it be requirements to come to have the function fixed to said

configuration which deformed in the temperature region of under glass transition temperature.
[0005] Specifically in the above, melting unification can mention bicomponent fiber gestalten, such as an assembling die with which the thermoplastic polymer (B) formed the core part, and the sheath-core mold to which thermoplastics (A) surrounded to vaginate and was joined or the above (A), and (B) were joined to the gestalt by which the melting blend of thermoplastics (A) and the thermoplastic polymer (B) is carried out by juxtaposition in the perimeter.
[0006] The filament of a configuration of having described above is usually manufactured as a multifilament gestalt by the melt spinning by application of melt spinning equipment. This is because the fiber bundle of the gestalt which is easy to transplant hair by a hair transplantation sewing machine etc. on a doll head continuously is constituted. Here, the cross section of a monofilament has the effective thing of not only a circle configuration but the other shape of a star type, Y mold, and an anomaly, and is suitably chosen by tactile feeling, a loft, curl workability, etc.
[0007] The range of 30-200 micrometers of outer diameters of a monofilament is 40-120 micrometers more preferably, and the thing of a less than 30-micrometer diameter is too thin, inferior in the holdout of curl, on the other hand, if 200 micrometers is exceeded, it becomes thick too much and cannot present description of hair easily.
[0008] as said thermoplastics (A) -- polyamide resin (6-nylon --) 6 and 6 nylon, 12-nylon, 6, 9 nylon, 612 nylon, 6-6, 6 copolyamides, 6-12 copolyamide, 6-6, 6-12 copolyamide, Polyester resin, such as polyethylene terephthalate, such as 6 and 9-12 copolyamide, and polybutylene terephthalate, Acrylonitrile-styrene copolymerization resin, acrylonitrile-butadiene-styrene resin, Polycarbonate resin, a vinyl chloride DIN-vinyl chloride copolymer, copolymerization acrylonitrile resin, Thermoplastic elastomer polyamide, such as polyamide-polyether block copolymerization resin, Styrene thermoplastic elastomers, such as styrene-butadiene block copolymerization resin, Polyolefine system thermoplastic elastomer, such as polypropylene-ethylene propylene rubber block copolymerization resin, The polymer chosen out of any of thermoplastic elastomer, such as poly-butadiene system thermoplastic elastomer, thermoplastic elastomer polyester, or an ethylene-acetic-acid BINI system copolymer, they are can be mentioned. It is general-purpose resin of fiber formation nature among the above mentioned resin, and since the melting point or softening temperature maintains rigidity with resin 100 degrees C or more proper as base resin and contributes to gestalt holdout, it is effective.
[0009] Furthermore, in order to hold the early shape of pliant flexibility for a long period of time, it is desirable to apply said thermoplastic elastomer. A Plastic solid passes by application of said elastomer, and it is avoided that ductility is lost and makes it hard by the time.
[0010] As a thermoplastic polymer (B), saturated polyester resin, acrylic ester resin, methacrylic ester resin, vinyl acetate resin, polyamide resin, an epoxy resin (non-hardened material), hydrocarbon resin, soft polyvinylchloride resin, ethylene vinyl acetate-copolymerization resin, vinyl chloride-vinyl acetate copolymerization resin, vinyl chloride-acrylic copolymerization resin, styrene resin, acrylic-styrene copolymerization resin, etc. can be mentioned. More preferably, still more preferably, glass transition temperature is desirable 0 degrees C or more 70 degrees C or less, and 20 degrees C - 65 degrees C of 5 degrees C - 65 degrees C of saturated polyester resin, acrylic resin, vinyl chloride-vinyl acetate copolymerization resin, styrene resin, etc. etc. are [a 30 degrees C - 50 degrees C thing is effective, and] suitable among said thermoplastic polymers (B), especially.
[0011] By choosing the thermoplastic polymer (B) in said glass-transition-temperature range, by the temperature of a life temperature requirement, its near or various kinds of hair form deformation fixtures better known than before, and application of a proper stress deformation means, it deforms into the hair form of an arbitration configuration, and has the function to hold said hair form which deformed by cooling, and a small child etc. can change a hair form simply and can play.
[0012] If a filament is in the gestalt by which the melting blend was carried out, a thermoplastic polymer (B) is chosen from the polymer with which the chemical structure differs from thermoplastics (A), and the condition that a distributed condition or distribution, and compatibility were intermingled by the thermoplastic polymer (B) makes the function of this invention discover effectively here. If the chemical structure is in the combination of the same resin, i.e., homogeneous resin a homogeneous compatible

object is formed and can be set more than the glass transition temperature of thermoplastics (B) -- visco-elastic, since description is discovered as it is, without being controlled by thermoplastics (A) proper Where both shaping filaments are piled up, when it is left, it will become easy to adhere mutually and, on the other hand, the fixed function in the temperature region of under glass transition temperature will also fall relatively.

[0013] As for the rate which a thermoplastic polymer (B) blends with thermoplastics (A), A/B=95 / 5 - 20/80 (weight ratio) are effective. Preferably If viscosity exceeds a large next door and 90 % of the weight as it is 90 / 10 - 50/50 and the weight of a thermoplastic polymer (B) increases if viscosity is too high, adhesiveness arises, Plastic solids are made close and it is left -- adhering -- etc. -- fault is produced, on the other hand, by less than 5% of the weight of the system, the operation by decline in the bending elastic modulus at the time of deformation processing is inadequate, it is not fully discovered and viscoelasticity cannot produce expected deformans easily. Here, the above (A) and (B) do not have single each, and plurality may be used together.

[0014] Per [of the raw material resin which forms said filament] kg, 0.05-1.0g of a common pigment, 1-20g of a fluorescent pigment, 10-100g of a microcapsule pigment, etc. can be blended, it can fabricate, and the colored filament can be constituted.

[0015] Furthermore, the light stabilizer chosen from light stabilizer more nearly general-purpose than before, for example, an ultraviolet ray absorbent, an antioxidant, an antioxidant, a singlet oxygen quencher, an ozone decolorizing agent, a visible-ray absorbent, and an infrared absorption agent is suitably blended into raw material resin, a filament can be formed or the light stabilizer layer which made the binder contain light stabilizer can be prepared in a front face.

[0016] Moreover, various plasticizers more nearly general-purpose than before, for example, a phthalic-acid system, an aliphatic series dibasic-acid-ester system, a phosphoric ester system, an epoxy system, a phenol system, a trimellitic acid system, etc. are blended one to 30% of the weight, deformable temperature can be reduced or flexibility can be given.

[0017] Furthermore, in order to improve workability, physical properties, etc., the color pigment of a calcium carbonate, a magnesium carbonate, titanium oxide, talc, and others etc. can be added.

[0018] In addition, the above mentioned thermochromism microcapsule pigment What carried out the endocyst of an electron-donative coloration nature organic compound, an electronic receptiveness compound, and the thermochromism ingredient containing three components of the organic compound medium which makes color reaction occur reversibly to the microcapsule is effective. JP,51-35414,B according to these people's proposal as this thermochromism ingredient, the thermochromism ingredient indicated by JP,51-44706,B, JP,1-17154,B, etc. -- or At the time of coloring indicated by JP,7-186546,A, the color which is rich in high coloring concentration and brightness, such as yellow which has fluorescence, yellow orange, orange, a red lamp color, and red, is presented. At the time of decolorization The electron-donative coloration nature organic compound chosen from the (b) pyridine system which there is no color remainder and presents colorlessness, a quinazoline system, and a bis-quinazoline system, (b) The compound which is electronic receptiveness to said electron-donative coloration nature organic compound, Said (b), the thermochromism ingredient which consists of a compatible object which uses as an indispensable component three components of the compound which is the reaction medium which makes the electronic transfer reaction by the (b) component occur reversibly in a specific temperature region, (Ha) Or are indicated by JP,4-17154,B which these people proposed. The temperature-sensing-and-color-changing-property color-memorizing thermochromism ingredient which shows a big hysteresis characteristic and is discolored, Namely, the configuration of the curve which plotted change of the coloring concentration by the temperature change It is the discoloration material of the type which follows a greatly different path and is discolored by the case where temperature is dropped from an elevated-temperature side from discoloration temperature to the case where temperature is raised from a low temperature side from a discoloration temperature region, and reverse. In the ordinary temperature region between a low temperature side transformation point and an elevated-temperature side transformation point, the thermochromism ingredient which has the description which can carry out storage maintenance of the condition of having made it changing at the

temperature below said low temperature side transformation point or more than an elevated-temperature side transformation point is also effective.
[0019] Moreover, the thermochromism ingredient of high sensitivity which has a hysteresis band 3 degrees C or less about the depth-of-shade-temperature curve by **** and the temperature change which were indicated to JP,1-29398,B which these people proposed is effective.
[0020] Although application as it is is also effective, as for the above mentioned thermochromism ingredient, it is most desirable to connote and use it for a microcapsule. That is because a thermochromism ingredient is maintained at the same presentation in various service conditions and the same operation effectiveness can be done so. By carrying out endocyst to said microcapsule, a stable pigment can be constituted chemically and physically and the thing of the particle diameter of 1-30 micrometers and the range of 5-15 micrometers can be applied.
[0021] Moreover, it distributes in the medium containing a binder, and said microcapsule pigment is applied as color material, such as ink and a coating, and can also form an reversible heat discoloration layer in a filament front face by coating or blasting processing.
[0022] The microcapsule pigment in the above can be made to contain one to 30% of the weight preferably 0.5 to 40% of the weight in a coating resin layer. In less than 0.5% of the weight of loadings, when it is hard to carry out vision of the clear heat discoloration effectiveness and 40 % of the weight is exceeded, it is superfluous, it is in a decolorization condition, and a remaining color may arise.
[0023] It sets for the fiber for the doll hairs of this invention, and also when thermoplastics (A) is transferred in the shape of [more than the glass transition temperature of a thermoplastic polymer (B)] viscoelasticity, the description of resin itself is maintained, and adhesiveness is controlled suitably and contributes it to evasion of the trouble at the time of adhesion of Plastic solids depended for adhering.
[0024] the saturated polyester resin whose thermoplastic elastomer is a polyamide system elastomer in said configuration carried out and whose glass transition temperature a thermoplastic polymer (B) is 0 degree C - 50 degrees C -- 5 - 80 weight section -- desirable -- a polyamide system elastomer / saturated polyester resin =80 / 20 - 30/70 (weight ratio) -- the range of 50 / 50 - 70/30 (weight ratio) is effective still more preferably. By specifying it as said range, the high intensity which the polyamide itself has, tactile feeling, and proper hygroscopicity are discovered proper, and while filling false nature with the hair, an expected deformation-fixed function is discovered effectively. Furthermore, the above mentioned false nature and the above mentioned deformation-fixed function are held with time and stably.
[0025] Although comparatively rigidity-description is presented in said configuration if a thermoplastic polymer (B) is in the temperature region below glass transition temperature visco-elastic above glass transition temperature, when it changes to description and a bending elastic modulus falls The rigidity of a thermoplastic rigidity polymer (B) originally and a bending elastic modulus fall relatively, the sex to the configuration of arbitration which can be transformed is obtained according to external force, and said configuration which deformed is returned and fixed to rigidity-description in the temperature region below glass transition temperature.
[0026] By the unification by thermoplastics (A) and the combination of the thermoplastic polymer (B) which has a specific glass transition temperature as this invention was described above The sex in a specific temperature region which cannot be discovered in each simple substance of thermoplastics (A) or a thermoplastic polymer (B) and which can be transformed, The deformation-stability which was equipped with the function which fixes the configuration which deformed in said temperature region in a specific temperature region, and was moreover described above The temperature of a life temperature requirement, or everyday heating, A cold energy means can attain simply, said hair form by which size enlargement was carried out is canceled further in the temperature region more than glass transition temperature, and the fiber for the doll hairs equipped with the delayed persistency which is equal to practical use of a repeat that it can deform - fix is given to the hair form of another arbitration.
[0027]
[Embodiment of the Invention] Although an example explains the fiber for this invention doll hairs still more concretely, this invention is not limited at all by this example. In addition, the weight section

shows the combination in an example.
[0028] It considers as example 1 thermoplastics (A). The copolymerization polyamide resin [trade name:die amide N1901, DAISERU Huels make, Mix the polyester resin [trade name:Pori Ester TP-217, product [made from Japanese Composition], and 40 degrees C of glass transition points] 200 section as the melting point [of 155 degrees C]]400 section, and a thermoplastic polymer (B), and general-purpose melt spinning equipment is used. The multifilament which a filament with an outer diameter of about 80 micrometers turns into from 24 was obtained from the dice which has the discharge opening of 24 holes by spinning and carrying out extension processing at 180 degrees C. Hair was transplanted with the well-known means on the head of the doll which consists said multifilament of plastics material, and the doll toy was constituted combining idiosoma.
[0029] The configuration was held, unless the hair changed into the condition of having curled with the same path as a curler and external force was applied, when the curler was removed after having twisted the hair of said doll toy around the hair curler of the shape of a cylinder with a diameter of 9mm, warming for 3 minutes in 42-degree C oven and leaving it under the room temperature of 25 degrees C subsequently.
[0030] Next, after fixing in the form which lengthened the hair of said curl condition in the straight-line condition and warming in 42-degree C oven again, it was left under the room temperature, and when the fastener was removed, the hair returned to the early straight condition.
[0031] Moreover, even if it did not use a fastener, after warming in 42-degree C oven, it was restored to the straight condition by brushing lengthening the hair with a comb, a brush, etc. promptly.
[0032] The repetition of deformation and immobilization at about 30 degrees C or less was possible for said formation of a form status change above about 42 degrees C, and it was able to take the desired configuration. This deformation and fixed temperature were an outline and a thing which changes bordering on the glass transition temperature of the used polyester resin.
[0033] The acrylic resin [trade name:diamond NARU BR-117, product [made from Mitsubishi Rayon], and glass transition temperature of 35 degrees C] 150 section was mixed as example 2 thermoplastics (A) as the isophthalic acid 35 mol % denaturation polybutylene terephthalate (melting point of 168 degrees C) 300 section, and a thermoplastic polymer (B), and the fiber for the doll hairs was obtained like the example 1.
[0034] When HEAKA-Ra of the shape of a cylinder with a same diameter [the / as an example 1] of 9mm was applied and the same trial was performed about said obtained fiber, deformation temperature is 38 degrees C and the deformation configuration was fixed by leaving it in room temperature of 20 degrees C after deformation. Deformation-immobilization was repeatable bordering on the glass transition temperature of 35 degrees C of acrylic resin.
[0035] the reversibility thermochromism ingredient which consists of the example 3 reversibility thermochromism microcapsule pigment preparation 1-, 2-Benz-6-diethylamino fluoran 2 section, 1, and 1-screw (4-hydroxyphenyl)-n-octane 6 section and the capric-acid stearyl 50 section -- the interface pile of an epoxy resin/amine -- therefore it microencapsulated lawfully and the reversibility thermochromism microcapsule pigment with a mean particle diameter of 10-20 micrometers was obtained. The obtained pigment changed reversibly to pink below colorlessness and about 28 degrees C above about 34 degrees C.
[0036] The thing 10 section which dried said microcapsule pigment and dehydrated, and the thermoplastics constituent 300 section obtained in the example 1 were mixed, melting mixing was carried out by the extruder at 180 degrees C, and the temperature-sensing-and-color-changing-property thermoplastics constituent was obtained. Said constituent changed reversibly to pink below colorlessness and 28 degrees C by 34 degrees C or more of outlines.
[0037] Then, by the same approach as an example 1, the multifilament which a filament with an outer diameter of about 80 micrometers turns into from 24 by spinning and carrying out extension processing at 180 degrees C was obtained from the dice which uses general-purpose melt spinning equipment for said resin constituent, and has the discharge opening of 24 holes, and this was offered as fiber for the doll hairs.

[0038] Said peach-colored hair was put between the plate with which top-most vertices carried out the wave in a cycle of 1cm from top-most vertices, and it fixed, and when put into 42-degree C oven, the hair changed from pink to colorlessness. The condition was held, unless it colored the hair to pink again when it was left under the room temperature of 25 degrees C, and the hair changed into the condition of having waved to the same period as a wave-like plate when the wave-like plate was removed and external force was applied, after warming for 3 minutes.
[0039] Subsequently, it fixed in the form which lengthened this hair that waved in the straight-line condition, when again warmed in 42-degree C oven, it changed to colorlessness, and when it was left under the room temperature, while coloring to pink, when a fastener was removed, it was restored to the early straight condition.
[0040] Said deformation-immobilization had deformation and repeatable immobilization at about 30 degrees C or less above about 42 degrees C, and this was what changes bordering on the glass transition temperature of the polyester resin which carried out outline use.
[0041] As example 4 thermoplastics (A), the polyester resin [trade name:Ely Tell UE-3500, Unitika, Ltd. make, and 30 degrees C of glass transition points] 300 section was mixed, melting mixing was carried out by the extruder at 190 degrees C as the [trade name:die amide E62 and die cel . Huels make] made from thermoplastic elastomer polyamide 400 section, and a thermoplastic polymer (B), and the thermoplastics constituent was obtained. The multifilament which consists of 20 filaments with a diameter of about 100 micrometers was obtained by using general-purpose melt spinning equipment for said constituent, and spinning and carrying out extension processing at 190 degrees C from the dice which has the discharge opening of 20 holes. Hair was transplanted on the head of a doll and said multifilament was used as the doll toy combining idiosoma.
[0042] The aforementioned hair was twisted around the hair curler with a diameter of 9mm, and it held for 5 minutes under the room temperature of 25 degrees C. Then, when the curler was removed, after the hair changed into the condition of having curled with the same path as a curler and maintained the condition for dozens of minutes, curl was canceled gradually and it was restored to the original straight condition by neglect on several hours - the 1st.
[0043] Moreover, the configuration was held, unless it changed into the condition of having curled with the same path as the path of a hair curler and external force was applied, when the curler was removed after warming for 3 minutes in 35-degree C oven in the condition of having wound around the curler and leaving it under the room temperature of 20 degrees C subsequently. Next, after fixing in the form which lengthened the hair of said curl condition in the straight-line condition and warming in 35-degree C oven again, it was left under the room temperature of 20 degrees C, and when the fastener was removed, the hair returned to the early straight condition.
[0044] Moreover, when the hair made to curl at said 35 degrees C was left under the room temperature of 25-30 degrees C, it returned [several hours -] to the straight condition of outline origin automatically by neglect on the 1st.
[0045] As a charge of example 5 matrix, as polyamide resin [trade name:Lil Sun AMNO, the Toray Industries, Inc. make, and the melting point of 180 degrees C], and a charge of a core material Saturated polyester resin [trade name : Made in [Toyobo Co., Ltd.] Byron 103, The multifilament which consists of a compound filament with a diameter [of heart-sheath structure] of 70 micrometers was obtained from the dice which uses 47 degrees-C [of glass transition points]] by the weight ratios 50/50, and has the discharge opening of eight holes using general-purpose bicomponent fiber spinning equipment by spinning at 200 degrees C.
[0046] The configuration was held, unless the hair changed into the condition of having curled with the same path as a curler and external force was applied, when the curler was removed after having twisted said multifilament around the hair curler of the shape of a cylinder with a diameter of 9mm, warming it for 3 minutes in 50-degree C oven and leaving it under the room temperature of 35 degrees C or less subsequently.
[0047] Next, after fixing in the form which lengthened the hair of said curl condition in the straight-line condition and warming in 50-degree C oven again, it was left under the room temperature, and when the

fastener was removed, the hair returned to the early straight condition.
[0048] Moreover, even if it did not use a fastener, after warming in 50-degree C oven, it was restored to the straight condition by brushing lengthening the hair with a comb, a brush, etc. promptly.
[0049] The repetition of deformation and immobilization at about 35 degrees C or less was possible for said deformation-immobilization above about 50 degrees C, and it was able to take the desired configuration.
[0050]
[Effect of the Invention] It can be made to deform into a simply free hair form suitably in a 30 degrees C - 60 degrees C temperature region. the fiber for the doll hairs of this invention -- the temperature region not more than ordinary temperature -70 degree C -- The hair form which deformed by cooling is fixable, if needed, said fixed hair form is restored to the original condition, or it has the delayed persistency of the repeat of being able to deform into another hair form, and even if a small child etc. has, the fiber for the doll hairs which can be made to be able to deform a hair form simply and can play can be offered.

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PATENT ABSTRACTS OF JAPAN

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(54) FIBER FOR DOLL HAIRS

(57)Abstract:
PROBLEM TO BE SOLVED: To allow even small children to change dolls' hair style easily for play by fusion-unifying altogether at a certain rate both the thermoplastic resin and glass transitional temperature thermoplastic polymer within a given temperature to compose filaments of outside diameter(OD) within a given range, providing the repeated deformation/restoration function and endurance.
SOLUTION: The fibers for doll hair consist of filaments whose outside diameter(OD) is 30-200 micro-m, that are formed by fusion-unifying at a rate of A/B=95/5-20/80 (w-%) altogether both the thermoplastic resin A and one or above two kinds of thermoplastic polymer B whose glass transitional temperature falls within a range of 0-70° C. This glass transitional temperature of thermoplastic polymer B is preferred to fall within this range. For the blending ratio vs. the thermoplastic resin A, the higher the weight in the thermoplastic polymer B, the higher the viscosity, thus, resulting in a difficulty in generating an initial deformation at the deformation process with a blending rate below 5%. If the filament OD is below 30 micro-m, it is too fine and is inferior in curls being held, while if it exceeds 20 micro-m, it is too thick to represent the hair nature.

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(54)【発明の名称】　人形頭髪用繊維

(57)【要約】

【課題】　常温～６０℃の温度域で簡易に自在な髪形に変形させることができ、冷却により前記変形した髪形を固定でき、必要に応じて、前記固定した髪形を元の形状に復元させたり、別の髪形に変形可能な、幼児等にあっても簡易に髪形の変形が楽しめる人形頭髪用繊維の提供。

【解決手段】　熱可塑性樹脂（Ａ）と、ガラス転移温度が０℃以上７０℃以下の範囲にある熱可塑性重合体（Ｂ）の一種又は二種以上が、（Ａ）／（Ｂ）＝９５／５～２０／８０（重量比）の割合で溶融一体化されてなる、外径が３０μｍ～２００μｍのフィラメントから構成される人形頭髪用繊維。

【特許請求の範囲】

【請求項１】　熱可塑性樹脂（Ａ）と、ガラス転移温度が０℃以上７０℃以下の範囲にある熱可塑性重合体（Ｂ）の一種又は二種以上が、（Ａ）／（Ｂ）＝９５／５～２０／８０（重量比）の割合で溶融一体化されてなる、外径が３０μｍ～２００μｍのフィラメントから構成される人形頭髪用繊維。

【請求項２】　熱可塑性樹脂（Ａ）と、ガラス転移温度が０℃以上７０℃以下の範囲にある熱可塑性重合体（Ｂ）の一種又は二種以上が、（Ａ）／（Ｂ）＝９５／５～２０／８０（重量比）の割合で溶融一体化されてなり、前記熱可塑性重合体（Ｂ）のガラス転移温度近傍の温度以上、融点未満の温度域で外部応力を加えることにより、前記応力に順応した形状に変形自在であり、ガラス転移温度未満の温度域で前記変形された形状に固定される機能を備えた人形頭髪用繊維。

【請求項３】　熱可塑性樹脂（Ａ）と、ガラス転移温度が０℃以上７０℃以下の範囲にある熱可塑性重合体（Ｂ）は、溶融ブレンドされて一体化されたフィラメントを構成している請求項１又は２の人形頭髪用繊維。

【請求項４】　熱可塑性樹脂（Ａ）と、ガラス転移温度が０℃以上７０℃以下の範囲にある熱可塑性重合体（Ｂ）は、相互が融着されて一体化した複合繊維形態のフィラメントを構成してなる請求項１又は２の人形頭髪用繊維。

【請求項５】　熱可塑性樹脂（Ａ）は、熱可塑性エラストマーから選ばれる請求項１乃至４の人形頭髪用繊維。

【請求項６】　熱可塑性エラストマーは、ポリアミド系、ポリウレタン系、スチレン系、ポリオレフィン系、ポリブタジエン系、ポリエステル系、又はエチレン－酢酸ビニル系共重合体の何れかより選ばれる重合体である請求項５の人形頭髪用繊維。

【請求項７】　熱可塑性重合体（Ｂ）は、熱可塑性樹脂（Ａ）とは、化学構造が異なる重合体から選ばれる請求項１乃至４のいずれかの人形頭髪用繊維。

【請求項８】　熱可塑性重合体（Ｂ）は、分散状態又は分散と相溶状態が混在された状態で存在してなる請求項１乃至４のいずれかの人形頭髪用繊維。

【請求項９】　熱可塑性重合体（Ｂ）は、飽和ポリエステル樹脂、アクリル酸エステル樹脂、メタクリル酸エステル樹脂、又は酢酸ビニル樹脂から選ばれる１種又は２種以上の重合体である請求項１乃至４のいずれかの人形頭髪用繊維。

【請求項１０】　熱可塑性樹脂（Ａ）は、融点又は軟化点が１００℃以上の樹脂から選ばれる請求項１乃至４のいずれかの人形頭髪用繊維。

【請求項１１】　熱可塑性エラストマーは、ポリアミド系エラストマーであり、熱可塑性重合体（Ｂ）が、０℃～５０℃のガラス転移温度を有する飽和ポリエステル樹脂であり、前記飽和ポリエステル樹脂が全樹脂の５～８０重量部の割合を占めてなる請求項１乃至４のいずれかの人形頭髪用繊維。

【請求項１２】　可逆熱変色性マイクロカプセル顔料が分散状態に含有されてなる請求項１乃至１１のいずれかの人形頭髪用繊維。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は人形頭髪用繊維に関する。詳細には、熱可塑性樹脂と、特定のガラス転移温度を有する熱可塑性重合体が所定割合で溶融一体化され、前記熱可塑性重合体のガラス転移温度近傍の温度以上、融点未満の温度域で外部応力を加えることにより任意形状に変形自在であり、前記変形された形状が、ガラス転移温度未満の温度域で固定される機能を備えた人形頭髪用繊維に関する。

【０００２】

【従来の技術】従来より、人形頭髪用繊維として、塩化ビニリデン系、塩化ビニル系の繊維やポリアミド及びポリプロピレン等の合成繊維が一般に使用されている。又、特公平５－７６８８０号公報には、アクリロニトリルと、塩化ビニル及び／又は塩化ビニリデンをそれぞれ所定割合で含むアクリル系重合体からなる合成繊維が開示されている。

【０００３】

【発明が解決しようとする課題】ところで、前記した合成繊維を用いた頭髪にあっては、繊維の軟化点以上の高温で、しかも特殊の治具を適用しなければ、髪形を変形させることができず、幼児等がカール等を施して自由に遊ぶことができない。本発明は、常温～７０℃以下の温度域、好適には３０℃～６０℃の温度域で簡易に自在な髪形に変形させることができ、冷却により変形した髪形を固定でき、必要に応じて、前記固定した髪形を元の状態に復元させたり、別の髪形に変形できる等の繰り返しの変形、復元機能と持久性を備え、幼児等にあっても簡易に髪形を変形させて遊ぶことができる人形頭髪用繊維を提供しようとするものである。

【０００４】

【課題を解決するための手段】本発明は、熱可塑性樹脂（Ａ）と、ガラス転移温度が０℃以上７０℃以下の範囲にある熱可塑性重合体（Ｂ）の一種又は二種以上が、（Ａ）／（Ｂ）＝９５／５～２０／８０（重量比）の割合で溶融一体化されてなる、外径が３０μｍ～２００μｍのフィラメントから構成される人形頭髪用繊維を要件とする。更には、熱可塑性樹脂（Ａ）と、ガラス転移温度が０℃以上７０℃以下の範囲にある熱可塑性重合体（Ｂ）の一種又は二種以上が、（Ａ）／（Ｂ）＝９５／５～２０／８０（重量比）の割合で溶融一体化されてなり、前記熱可塑性重合体（Ｂ）のガラス転移温度近傍の温度以上、融点未満の温度域で外部応力を加えることにより、前記応力に順応した形状に変形自在であり、ガラ

ス転移温度未満の温度域で前記変形された形状に固定される機能を備えてなることを要件とする。

【０００５】前記において、溶融一体化は、具体的には、熱可塑性樹脂（Ａ）と熱可塑性重合体（Ｂ）が溶融ブレンドされている形態と、熱可塑性重合体（Ｂ）が芯部を形成し、その周囲を熱可塑性樹脂（Ａ）が鞘状に取り巻き接合された芯鞘型、或いは前記（Ａ）及び（Ｂ）が並列に接合された接合型等の複合繊維形態とを挙げることができる。

【０００６】前記した構成のフィラメントは、溶融紡糸装置の適用による溶融紡糸により、通例、マルチフィラメント形態として製造される。これは、人形頭部に植毛ミシン等により連続的に植毛し易い形態の繊維束が構成されるからである。ここで、モノフィラメントの断面は、円形状に限らず、星型、Ｙ型、その他の異形状のものが有効であり、触感、嵩高性、カール加工性等により適宜選択される。

【０００７】モノフィラメントの外径は、３０～２００μｍ、より好ましくは、４０～１２０μｍの範囲であり、３０μｍ未満の径のものは、細すぎて、カールの保持性が劣り、一方、２００μｍを越えると太くなり過ぎて、毛髪の性状を呈し難い。

【０００８】前記熱可塑性樹脂（Ａ）としては、ポリアミド樹脂（６－ナイロン、６，６ナイロン、１２－ナイロン、６，９ナイロン、６１２ナイロン、６－６，６共重合ナイロン、６－１２共重合ナイロン、６－６，６－１２共重合ナイロン、６，９－１２共重合ナイロン等）、ポリエチレンテレフタレート、ポリブチレンテレフタレート等のポリエステル樹脂、アクリロニトリルースチレン共重合樹脂、アクリロニトリルーブタジエンースチレン樹脂、ポリカーボネート樹脂、塩化ビニルデン－塩化ビニル共重合体、共重合アクリロニトリル樹脂、ポリアミドーポリエーテルブロック共重合樹脂等のポリアミド系熱可塑性エラストマー、スチレンーブタジエンブロック共重合樹脂等のスチレン系熱可塑性エラストマー、ポリプロピレンーエチレンプロピレンラバーブロック共重合樹脂等のポリオレフィン系熱可塑性エラストマー、ポリブタジエン系熱可塑性エラストマー、ポリエステル系熱可塑性エラストマー、或いはエチレン－酢酸ビニ系共重合体等の熱可塑性エラストマーの何れかより選ばれる重合体等を挙げることができる。前記した樹脂のうち、繊維形成性の汎用の樹脂であり、融点又は軟化点が１００℃以上の樹脂が基体樹脂としての適正な剛性を維持して形態保持性に寄与するので有効である。

【０００９】更には、初期のしなやかな柔軟性状を長期間保持するには、前記熱可塑性エラストマーを適用することが望ましい。前記エラストマーの適用により成形体が経時により、しなやかさが失われて硬質化することが回避される。

【００１０】熱可塑性重合体（Ｂ）としては、飽和ポリエステル樹脂、アクリル酸エステル樹脂、メタクリル酸エステル樹脂、酢酸ビニル樹脂、ポリアミド樹脂、エポキシ樹脂（未硬化物）、炭化水素樹脂、軟質塩化ビニル樹脂、エチレン酢酸ビニル－共重合樹脂、塩化ビニル－酢酸ビニル共重合樹脂、塩化ビニル－アクリル共重合樹脂、スチレン樹脂、アクリルースチレン共重合樹脂等を挙げることができる。前記熱可塑性重合体（Ｂ）のうち、ガラス転移温度が０℃以上７０℃以下、好ましくは、５℃～６５℃、より好ましくは、２０℃～６５℃、更に好ましくは、３０℃～５０℃のものが効果的であり、中でも、飽和ポリエステル樹脂、アクリル系樹脂、塩化ビニル－酢酸ビニル共重合樹脂、スチレン樹脂等が好適である。

【００１１】前記ガラス転移温度範囲にある熱可塑性重合体（Ｂ）を選択することにより、生活温度範囲の温度、或いはその近傍、或いは従来より公知の各種の髪形変形治具や、適宜の応力変形手段の適用により、任意形状の髪形に変形し、冷却により前記変形した髪形を保持する機能を有し、幼児等が簡易に髪形を変えて遊ぶことができる。

【００１２】ここで、フィラメントが溶融ブレンドされた形態にあっては、熱可塑性重合体（Ｂ）は、熱可塑性樹脂（Ａ）とは、化学構造が異なる重合体から選ばれ、熱可塑性重合体（Ｂ）が分散状態又は分散と相溶が混在された状態が本発明の機能を有効に発現させる。化学構造が同一の樹脂同士、即ち、同質の樹脂同士の組み合わせにあっては、均質な相溶体を形成し、熱可塑性樹脂（Ｂ）のガラス転移温度以上における粘弾性的性状が、熱可塑性樹脂（Ａ）により適正にコントロールされることなくそのまま発現されるので、成形フィラメント相互を重ねた状態で放置したとき等には、相互にくっつき易くなりがちであり、一方、ガラス転移温度未満の温度域における固定化機能も相対的に低下することになる。

【００１３】熱可塑性樹脂（Ａ）と、熱可塑性重合体（Ｂ）のブレンドする割合はＡ／Ｂ＝９５／５～２０／８０（重量比）が有効であり、好ましくは、９０／１０～５０／５０であり、熱可塑性重合体（Ｂ）の重量が増加するに従い粘性が大となり、９０重量％を越えると、粘性が高すぎて粘着性が生じ、成形体同士を密接させて放置するとくっつき等の不具合を生じ、一方、５重量％未満の系では、変形処理時における曲げ弾性率の低下による作用が不十分であり、粘弾性が十分に発現されず所期の変形性を生じ難い。ここで、前記（Ａ）及び（Ｂ）は、それぞれが単一でなく、複数を併用してもよい。

【００１４】前記フィラメントを形成する原料樹脂の１ｋｇ当り、一般顔料の０．０５～１．０ｇ、蛍光顔料の１～２０ｇ、マイクロカプセル顔料の１０～１００ｇ等をブレンドして成形し、彩色したフィラメントを構成することができる。

【００１５】更には、従来より汎用の光安定剤、例え

ば、紫外線吸収剤、酸化防止剤、老化防止剤、一重項酸素消光剤、オゾン消色剤、可視光線吸収剤、赤外線吸収剤から選ばれる光安定剤を原料樹脂中に適宜配合してフィラメントを形成したり、光安定剤を固着剤に含有させた光安定剤層を表面に設けることができる。

【００１６】又、従来より汎用の各種可塑剤、例えば、フタル酸系、脂肪族二塩基酸エステル系、リン酸エステル系、エポキシ系、フェノール系、トリメリット酸系等を１～３０重量%配合して、変形可能温度を低下させたり、柔軟性を付与することができる。

【００１７】更に、加工性、物性等を改善するために、炭酸カルシウム、炭酸マグネシウム、酸化チタン、タルク、その他の着色顔料等を添加できる。

【００１８】尚、前記した熱変色性マイクロカプセル顔料は、電子供与性呈色性有機化合物と電子受容性化合物と呈色反応を可逆的に生起させる有機化合物媒体の三成分を含む熱変色性材料をマイクロカプセルに内包させたものが有効であり、該熱変色性材料としては、本出願人の提案による特公昭５１－３５４１４号公報、特公昭５１－４４７０６号公報、特公平１－１７１５４号公報等に記載されている熱変色性材料、或いは、特開平７－１８６５４６号公報に記載されている、発色時には蛍光性を有する黄色、黄橙色、橙色、赤橙色、赤色等の高発色濃度且つ明るさに富む色を呈し、消色時には、色残りがなく無色を呈する、（イ）ピリジン系、キナゾリン系、及びビスキナゾリン系から選ばれる電子供与性呈色性有機化合物、（ロ）前記電子供与性呈色性有機化合物に対して電子受容性である化合物、（ハ）前記（イ）、（ロ）成分による電子授受反応を特定温度域において可逆的に生起させる反応媒体である化合物の３成分を必須成分とする相溶体からなる熱変色性材料等、或いは、本出願人が提案した特公平４－１７１５４号公報等に記載されている、大きなヒステリシス特性を示して変色する感温変色性色彩記憶性熱変色性材料、即ち、温度変化による着色濃度の変化をプロットした曲線の形状が、温度を変色温度域より低温側から温度を上昇させていく場合と逆に変色温度より高温側から下降させていく場合とで大きく異なる経路を辿って変色するタイプの変色材であり、低温側変色点と高温側変色点の間の常温域において、前記低温側変色点以下又は高温側変色点以上の温度で変化させた状態を記憶保持できる特徴を有する熱変色性材料も有効である。

【００１９】又、本出願人が提案した特公平１－２９３９８号公報に記載した如き、温度変化による色濃度－温度曲線に関し、３℃以下のヒステリシス幅をもつ、高感度の熱変色性材料が有効である。

【００２０】前記した熱変色性材料は、そのままの適用でも有効であるが、マイクロカプセルに内包して使用するのが最も好ましい。それは、種々の使用条件において熱変色性材料は同一の組成に保たれ、同一の作用効果を奏することができるからである。前記マイクロカプセルに内包させることにより、化学的、物理的に安定な顔料を構成でき、粒子径１～３０μm、５～１５μmの範囲のものを適用できる。

【００２１】又、前記マイクロカプセル顔料は、固着剤を含む媒体中に分散されて、インキ、塗料などの色材として適用され、コーティング或いは吹き付け加工等によりフィラメント表面に可逆熱変色層を形成することもできる。

【００２２】前記におけるマイクロカプセル顔料は、コーティング樹脂層中に０．５～４０重量%、好ましくは１～３０重量%含有させることができる。０．５重量%未満の配合量では鮮明な熱変色効果を視覚させ難いし、４０重量%を越えると、過剰であり、消色状態にあって残色が生じることもある。

【００２３】本発明の人形頭髪用繊維において、熱可塑性樹脂（Ａ）は、熱可塑性重合体（Ｂ）のガラス転移温度以上における粘弾性状に転移した際にも、樹脂自体の性状が維持されており、粘着性が適宜に抑制されて、成形体同士の密着時におけるくっつきによるトラブルの回避に寄与する。

【００２４】前記した構成において、熱可塑性エラストマーがポリアミド系エラストマーであり、熱可塑性重合体（Ｂ）がガラス転移温度が０℃～５０℃の飽和ポリエステル樹脂が５～８０重量部、好ましくは、ポリアミド系エラストマー／飽和ポリエステル樹脂＝８０／２０～３０／７０（重量比）、更に好ましくは、５０／５０～７０／３０（重量比）の範囲が有効である。前記範囲に特定することにより、ポリアミド自体のもつ高強度、触感、適宜の吸湿性が適正に発現され、頭髪との擬似性を満たすと共に所期の変形－固定機能が効果的に発現される。更には、前記した擬似性と変形－固定機能が経時的にも安定的に保持される。

【００２５】前記構成において、熱可塑性重合体（Ｂ）は、ガラス転移温度以下の温度域にあっては、比較的剛性的性状を呈しているが、ガラス転移温度以上では粘弾性的性状に変化し、曲げ弾性率が低下することにより、本来剛性的な熱可塑性重合体（Ｂ）の剛性と曲げ弾性率が相対的に低下して、外部応力により任意の形状への変形自在性が得られ、前記変形した形状は、ガラス転移温度以下の温度域で剛性的性状に復帰し固定される。

【００２６】本発明は、前記したとおり、熱可塑性樹脂（Ａ）と、特定のガラス転移温度を有する熱可塑性重合体（Ｂ）の組み合わせによる一体化により、熱可塑性樹脂（Ａ）或いは熱可塑性重合体（Ｂ）の各単体では発現できない、特定温度域における変形自在性と、前記温度域で変形した形状を特定温度域で固定する機能を備え、しかも前記した変形－固定性が生活温度範囲の温度或いは日常的な加熱、冷熱手段により簡易に達成でき、更に前記賦形された髪形をガラス転移温度以上の温度域で解

除して、別の任意の髪形に変形－固定できるといった、繰り返しの実用に耐える持久性を備えた人形頭髪用繊維を与える。

【００２７】

【発明の実施の形態】本発明人形頭髪用繊維を実施例によってさらに具体的に説明するが、本発明はこの実施例によって何ら限定されるものではない。尚、実施例中の配合は重量部で示す。

【００２８】実施例１

熱可塑性樹脂（Ａ）として共重合ポリアミド樹脂〔商品名：ダイアミドＮ１９０１、ダイセルヒュルス（株）製、融点１５５℃〕４００部、熱可塑性重合体（Ｂ）としてポリエステル樹脂〔商品名：ポリエスターＴＰ－２１７、日本合成（株）製、ガラス転移点４０℃〕２００部を混合し、汎用の溶融紡糸装置を使用して、２４孔の吐出孔を有するダイスから１８０℃で紡出し、延伸処理することにより、外径約８０μｍのフィラメントが２４本からなるマルチフィラメントを得た。前記マルチフィラメントをプラスチック材からなる人形の頭部に公知の手段により植毛し、胴体部と組み合わせて人形玩具を構成した。

【００２９】前記人形玩具の頭髪を直径９ｍｍの円筒状のヘアーカーラーに巻き付け、４２℃のオーブン中で３分間加温し、次いで２５℃の室温下で放置した後、カーラーを外すと、頭髪はカーラーと同一径でカールした状態となり、外力を加えない限り、その形状を保持した。

【００３０】次に、前記カール状態の頭髪を直線状態に伸ばした形で固定し、再び４２℃のオーブン中で加温した後、室温下で放置し、固定具を取り去ると頭髪は初期のストレート状態に戻った。

【００３１】又、固定具を使わなくとも、４２℃のオーブン中で加温した後、速やかに櫛、ブラシ等で頭髪を伸ばしながらブラッシングすることによりストレート状態に復した。

【００３２】前記形状変化は、約４２℃以上で変形、約３０℃以下での固定が繰返し可能で、所望の形状をとることができた。この変形、固定温度は概略、使用したポリエステル樹脂のガラス転移温度を境に変化するものであった。

【００３３】実施例２

熱可塑性樹脂（Ａ）としてイソフタル酸３５モル%変性ポリブチレンテレフタレート（融点１６８℃）３００部、熱可塑性重合体（Ｂ）としてアクリル樹脂〔商品名：ダイヤナールＢＲ－１１７、三菱レーヨン（株）製、ガラス転移温度３５℃〕１５０部を混合し、実施例１と同様にして人形頭髪用繊維を得た。

【００３４】前記得られた繊維について、実施例１と同様の直径９ｍｍの円筒状のヘアーカーラーを適用し、同様の試験を行ったところ、変形温度は３８℃であり、変形後２０℃の室温に放置することにより変形形状が固定された。アクリル樹脂のガラス転移温度３５℃を境に変形－固定が繰り返し可能であった。

【００３５】実施例３

可逆性熱変色性マイクロカプセル顔料の調製

１，２－ベンゾ－６－ジエチルアミノフルオラン２部、１，１－ビス（４－ヒドロキシフェニル）－ｎ－オクタン６部、カプリン酸ステアリル５０部からなる可逆性熱変色性材料をエポキシ樹脂／アミンの界面重合法によってマイクロカプセル化して平均粒子径１０～２０μｍの可逆性熱変色性マイクロカプセル顔料を得た。得られた顔料は約３４℃以上で無色、約２８℃以下で桃色に可逆的に変化した。

【００３６】前記マイクロカプセル顔料を乾燥、脱水したもの１０部と、実施例１で得られた熱可塑性樹脂組成物３００部を混合し、１８０℃でエクストルーダーにて溶融混合し、感温変色性熱可塑性樹脂組成物を得た。前記組成物は概略３４℃以上で無色、２８℃以下で桃色に可逆的に変化した。

【００３７】続いて、実施例１と同様の方法により、前記樹脂組成物を汎用の溶融紡糸装置を使用して、２４孔の吐出孔を有するダイスから１８０℃で紡出し、延伸処理することにより、外径約８０μｍのフィラメントが２４本からなるマルチフィラメントを得、これを人形頭髪用繊維として供した。

【００３８】前記桃色の頭髪を頂点から頂点が１ｃｍ周期の波形をした板に挟み込んで固定し、４２℃のオーブンに入れると頭髪は桃色から無色に変化した。３分間加温した後、２５℃の室温下に放置すると頭髪は再び桃色に発色し、波形の板を取り外すと頭髪は、波形の板と同一周期にウエーブした状態となり、外力を加えない限り、その状態を保持した。

【００３９】次いで、このウエーブした頭髪を直線状態に伸ばした形で固定し、再び４２℃のオーブン中で加温すると無色に変化し、室温下で放置すると桃色に発色すると共に固定具を取り去った時には、初期のストレート状態に復した。

【００４０】前記変形－固定は、約４２℃以上で変形、約３０℃以下での固定が繰り返し可能で、これは概略使用したポリエステル樹脂のガラス転移温度を境に変化するものであった。

【００４１】実施例４

熱可塑性樹脂（Ａ）として、ポリアミド系熱可塑性エラストマー〔商品名：ダイアミドＥ６２、ダイセル・ヒュルス（株）製〕４００部、熱可塑性重合体（Ｂ）として、ポリエステル樹脂〔商品名：エリーテルＵＥ－３５００、ユニチカ（株）製、ガラス転移点３０℃〕３００部を混合し、１９０℃でエクストルーダーにて溶融混合し、熱可塑性樹脂組成物を得た。前記組成物を汎用の溶融紡糸装置を使用して、２０孔の吐出孔を有するダイスから、１９０℃で紡出し、延伸処理することにより、直

径約１００μｍのフィラメント２０本からなるマルチフィラメントを得た。前記マルチフィラメントを人形の頭部に植毛し、胴体部と組み合わせて人形玩具とした。

【００４２】前記の頭髪を直径９ｍｍのヘアーカーラーに巻き付け、２５℃の室温下で５分間保持した。その後、カーラーを外すと、頭髪はカーラーと同一径でカールした状態となり、数十分間その状態を保った後、徐々にカールが解除され、数時間～１日放置により元のストレート状態に復した。

【００４３】又、カーラーに巻いた状態で３５℃のオーブン中で３分間加温し、次いで２０℃の室温下で放置した後、カーラーを外すとヘアーカーラーの径と同一径でカールした状態となり、外力を加えない限り、その形状を保持した。次に、前記カール状態の頭髪を直線状態に伸ばした形で固定し、再び３５℃のオーブン中で加温した後、２０℃の室温下で放置し、固定具を取り去ると頭髪は初期のストレート状態に戻った。

【００４４】又、前記３５℃でカールさせた頭髪を２５～３０℃の室温下で放置しておくと数時間～１日放置により概略元のストレート状態に自然に戻った。

【００４５】実施例５

鞘材料として、ポリアミド樹脂〔商品名：リルサンＡＭＮＯ、東レ（株）製、融点１８０℃〕、芯材料として、飽和ポリエステル樹脂〔商品名：バイロン１０３、東洋紡（株）製、ガラス転移点４７℃〕とを重量比５０／５０で使用し、汎用の複合繊維紡糸装置を使用して８孔の吐出孔を有するダイスから、２００℃で紡出することにより、芯－鞘構造の直径７０μｍの複合フィラメントからなるマルチフィラメントを得た。

【００４６】前記マルチフィラメントを、直径９ｍｍの円筒状のヘアーカーラーに巻き付け、５０℃のオーブン中で３分間加温し、次いで３５℃以下の室温下で放置した後、カーラーを外すと、頭髪はカーラーと同一径でカールした状態となり、外力を加えない限り、その形状を保持した。

【００４７】次に、前記カール状態の頭髪を直線状態に伸ばした形で固定し、再び５０℃のオーブン中で加温した後、室温下で放置し、固定具を取り去ると頭髪は初期のストレート状態に戻った。

【００４８】又、固定具を使わなくとも、５０℃のオーブン中で加温した後、速やかに櫛、ブラシ等で頭髪を伸ばしながらブラッシングすることによりストレート状態に復した。

【００４９】前記変形－固定は、約５０℃以上で変形、約３５℃以下での固定が繰返し可能で、所望の形状をとることができた。

【００５０】

【発明の効果】本発明の人形頭髪用繊維は、常温～７０℃以下の温度域、好適には３０℃～６０℃の温度域で簡易に自在な髪形に変形させることができ、冷却により変形した髪形を固定でき、必要に応じて、前記固定した髪形を元の状態に復元させたり、別の髪形に変形できる等の繰り返しの持久性を備え、幼児等にあっても簡易に髪形を変形させて遊ぶことができる人形頭髪用繊維を提供することができる。